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B.O.T. and Reconversion Prospects

The Board of Trade has now disclosed its policy in respect to the conduct of industry post-war and during the transitional period. The first step was the appointment of Sir Charles Bruce-Gardner as the chief executive officer for industrial reconversion and Sir Philip Warter as controller-general of factory and storage premises. Now the Board has appointed regional controllers for the thirteen defence regions into which the United Kingdom and Northern Ireland are divided. The first duty of these new officials will be to co-operate with the existing regional boards set up by the Ministry of Production, over which the regional controller of that Ministry presides. Thus, as the factories find themselves short of work against war contracts, instead of searching here and there for permission to manufacture civilian goods, and finally losing themselves in a maze of Ministerial taboos, they will now be able to focus their efforts on this one official.

The present intention is to retain this political set-up permanently, and Mr. Dalton has clearly defined its four functions. First, it is charged with the colossal task of the reconversion of industry from war production to peacetime manufactures. Its second duty is the "de-requisitioning" of factory and storage space. The horrible word we have quoted is Whitehall jargon for the returning of borrowed property. Associated with this activity is the disposal by leasing—not by sale—of the 1,000 odd factories built with public money during the war. It is interesting to learn that already the demand is in excess of the supply, and that the factories will not be disposed of to the highest bidder. The Board of Trade will select from amongst the applicants the one whose activities have the best chance of giving a balanced and diversified employment in any particular area. By this means a limited control will be exercised by the Government as to the location of industries. Moreover, the release of factories and storage space will be co-ordinated with the labour and raw material supply situations in mind. These considerations link up with the third main function of the regional controllers, which is the distribution of industry, with special reference to the new development areas. The fourth function is the deconcentration of civilian industry and release of materials and labour. Their duties thereafter will combine the activities of a business consultant and an industrial forecaster, as the Government has no intention of being taken by surprise through lack of advance information as to any local decline in industrial employment.

So far as the foundry industry is immediately concerned, the appointment of regional controllers provides a series of focal points to which it can take those urgent problems associated with the production of prototypes of civilian goods, such as new models of cooking stoves and domestic hardware. At the moment, enthusiastic support is given by one Ministry, frigid acquiescence by another and a flat refusal by a third. It is by no means unusual for three or four Ministries to be involved before permission is received to make a model upon the perfection of which depends the very post-war existence of a factory or one of its major departments. The fact that only 600 licences have been granted to the whole of industry illustrates most clearly how necessary was the creation of a system designed to place our peacetime industrial activity potential into its rightful, though at present minor, place amongst our prodigious wartime productions.

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FORTHCOMING EVENTS

JANUARY 15.

Sheffield Society of Engineers and Metallurgists :—Annual general meeting and lecture on "Ship Model Testing," by A. Emmerson, of the National Physical Laboratory.

JANUARY 18.

Iron and Steel Institute :—Joint meeting with the Staffordshire Iron and Steel Institute. Paper on "Some Observations on the Austempering and Isothermal Transformation of Steels, with Special Reference to the Production of Martensite," by Prof. F. C. Thompson and Dr. L. R. Stanton. At the Dudley and Staffordshire Technical College, The Broadway, Dudley.

Institute of British Foundrymen

JANUARY 13.

Bristol Branch :—"Bronze Castings," by E. J. L. Howard. At the Grand Hotel, Broad Street, Bristol, at 3 p.m.

Scottish Branch :—"Control and Foundry Production of Grey Iron and Special Duty Iron Castings," by R. R. Taylor. At the Royal Technical College, George Street, Glasgow, at 3 p.m.

West Riding of Yorkshire Branch :—"The Centrifugal Casting Process for the Production of General Castings," by Dr. J. E. Hurst. At the Technical College, Bradford, at 6.30 p.m.

JANUARY 22.

Sheffield Branch :—"Joint meeting with the Iron and Steel Institute. Discussion of a Paper by W. Davies and W. J. Rees on "The Effect of Grain Shape on the Moulding Properties of Synthetic Moulding Sands." At the Royal Victoria Hotel, Sheffield, at 7 p.m.

JANUARY 24.

London Branch :—"Gunmetal Bearings," by F. Holligan. At the Charing Cross Hotel, London, W.C.2.

JANUARY 27.

East Midlands Branch :—"Moulding Sands and Gases in Relation to Casting Defects," by G. W. Nicholls. At the Technical College, Derby, at 6 p.m.

18,000-TON DIE-FORGING PRESS

The U.S. War Production Board announced recently that the Mesta Machine Company, of Pittsburgh, was constructing an 18,000-ton die-forging press, the largest ever installed in the United States. The new press will contribute to the development of larger and more efficient aircraft components and other military equipment where larger forgings are required. No die-forging press over 10,000 tons capacity has previously been available for production of light metal forgings in this country.

Development of the new forging project was sponsored by the W.P.B. and financed by the Defence Plant Corporation, of the U.S. Reconstruction Finance Corporation, at an estimated cost of $3,500,000. While intended primarily for the forging of magnesium, the press may also be used on aluminium or other metals. A subsidiary of the Wyman-Gordon Company, Worcester, Mass., has been chosen to erect and operate the plant installed for the Defence Plant Corporation. Production is expected to begin within a year.

CORRESPONDENCE

[We accept no responsibility for the statements made or the opinions expressed by our correspondents.]

IMPREGNATION OF MAGNESIUM CASTINGS

To the Editor of THE FOUNDRY TRADE JOURNAL.

SIR,—We would like to comment on the article, "Plastic Impregnation of Magnesium Castings," reprinted from the American "Iron Age" in your issue dated December 28, 1944. The first sentence may be good popular journalism since it immediately attracts attention to the subject, but to the inexperienced layman it conveys a totally inaccurate impression of the general standard of soundness of magnesium alloy castings, for you will recall that it states: "Magnesium castings used in aircraft engines have innumerable tiny holes which must be impregnated and sealed in order that the gases of combustion and lubricating oils be retained."

We can hardly believe that this statement is a true description of American magnesium alloy castings, but it is certainly not true of English production. The company with which I am associated had been making magnesium alloy castings for aircraft hydraulic systems for more than five years, and impregnation by any method had not been used. As an example, we have on record the pressure test results of some 10,000 magnesium alloy castings, and rejections due to lack of pressure tightness are less than 3 per cent. It is true, of course, that plastic impregnation would have enabled us to salvage most of these 3 per cent. rejections. We do submit, however, that we, in common with most English magnesium founders, can refute the American statement.

There is hardly need to call your attention to the fact that most alloys, aluminium and cast iron included, may suffer from porosity, and castings in these metals are often salvaged by impregnation. Certainly magnesium alloys do not have a monopoly of porosity.

Yours, etc.,

MAGNAL PRODUCTS, LIMITED.
F. A. Allen, Chief Metallurgist.

Warmley,
Bristol.
December 30, 1944.

THE INSTITUTE OF AUSTRALIAN FOUNDRYMEN

The autumn session of the Victorian Branch of the Institute of Australian Foundrymen included a Paper on heat-treatment and two on machine-tool castings. Mr. S. C. Johnson, of Australian Paper Manufacturers, Limited, was the author of the first. The first Paper on machine tools was read by Mr. W. J. C. Paterson, machine shop foreman, Johns & Waygood, Limited, and the second by Mr. W. T. Marn, of T. Marn & Sons Pty., Limited, a past-president of the Institute.

MR. E. W. OAKES has joined the Sandiron group of companies, controlled by Hinckleys, Limited, Sandiron House, Beauchief, Sheffield, as director of production.

METHODS AND PROBLEMS INDIGENOUS TO A GENERAL ENGINEERING IRON-FOUNDRY*

The jobbing shop as a training ground for moulders

By WILLIAM MONTGOMERY and JOHN DOIG, Junr., Leven

In all the foundry industry there is, perhaps, no better training ground for moulders than the general jobbing shop. Miscellaneous work of a general engineering character breeds, in those people connected with it, a genius for extemporising. The "one-off" problem is ever uppermost in their minds and each casting presents its own peculiar difficulties. Mechanisation, on anything other than a limited scale, is impossible. The benefits of working a smooth throughput on mass-production methods are just non-existent. In spite of (or is it because of?) the lack of technical development and scientific control, these foundries have become the repositories of many former methods of the moulder's craft, which are fast disappearing in the face of mechanisation and mass production. In these foundries the patternmaker and moulder must, by reason of the class of work engaged upon, work even more closely together in the consideration of

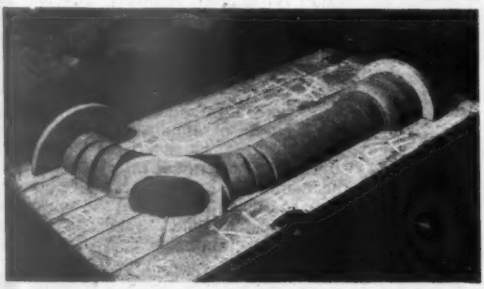

FIG. 1.—"SHELL" PATTERN ON BOARD.

foundry problems and moulding methods than in any other section of the industry. Indeed, so diverse are the types of castings tackled in jobbing foundries and so variable are the conditions of labour and materials between one locale and another that small variations in practice are inevitable.

The knowledge that such variables in the moulding of similar castings exist has encouraged the Authors to present what is, in effect, a brief description of some interesting points in the practice of one foundry engaged in the production of miscellaneous engineering castings.

* A Paper read before the Falkirk Section of the Scottish Branch of the Institute of British Foundrymen, Mr. R. R. Taylor presiding.

Perhaps one of the most striking and at the same time the most interesting example of jobbing practice is in the manufacture of pipes with "shell" patterns. This method of moulding pipes of all shapes and sizes without the advantage of pattern and corebox is probably less known than one might be inclined to think. On the one hand are the pipe foundries, where quantity production is the main care and where specialisation ensures that the proper pattern equipment is readily available, and, on the other, are the

FIG. 2.—"SHELL" PIPE: DRAG FINISHED TO RECEIVE CORE.

large number of foundries which do no pipe work of any kind. Shell work typifies moulding at its most skilled level.

Cast-iron Pipes from Shell Patterns

This method is dealt with in some detail, as it is confined, by reason of economies, to the "one-off" job when full pattern equipment cannot be considered. When the moulding board is received from the pattern-shop, the pipe section has already been drawn on it in full size and the flanges screwed down in their respective positions.

A level bed of sand is the first care, and on this is placed the moulding board. The shells are mounted

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on the latter and held in alignment by means of a beading which runs from one flange to the other, on the board, and follows one side of the drawn-out contour of the pipe section. Fig. 1 shows the shells properly positioned on the board. The bottom half of the moulding box is placed on the board and over the shells and ramming proceeded with. Box and board are turned over; the latter is removed and the former embedded in the floor to the parting level, as is shown in Fig. 2. The core iron is then laid in position to the moulder's satisfaction and the bottom half of the core rammed to the joint. After setting the top-half flanges, the upper half of the core is progressively rammed under the shells. The venting of the core is taken care of at this stage by including a central line of ashes down the length of the core prior to ramming the top half.

The next step in the sequence would naturally be the ramming of the cope. After the latter is lifted, the core may be removed, the shells stripped from the drag and the whole assembly finished. The parts are shown, prior to setting the core and closing the mould in Fig. 3. In any foundry where shell-pipe practice is followed, the pattern store usually carries shells and shapes to suit a wide variety of pipe diameters and thicknesses. Of course, where standard straights and bends are concerned, and when repeat orders in a certain line may be anticipated, long patterns with movable flanges may well suit the case better. Each job must be judged on its own merits and sometimes the occasion arises, in this class of work, when the foundry manager must be prepared "to put it to the touch, or win or lose it all."

FIG. 3.—COPE, CORE AND DRAG OF "SHELL" PIPE.

Jointed Core Irons

An important method of making pipe core irons in a manner such that they may be removed with ease from cores in pipes which have branches, bends and so on, is illustrated in Figs. 4 and 5. A cast-on mandrel effects easy jointing of the two parts of the core iron, which is made as follows:—

In the usual way the core iron is moulded in open sand on a flat bed, but at the location where the joint is required a piece of tinplate, with a square hole in the centre through which is inserted a mandrel, is placed upright in the mould cavity (see Fig. 4). One side of the mandrel is serrated to give a good grip when cast on to the male side of the core iron; the other side is coated with black wash and this has the desired effect of preventing this part of the man-

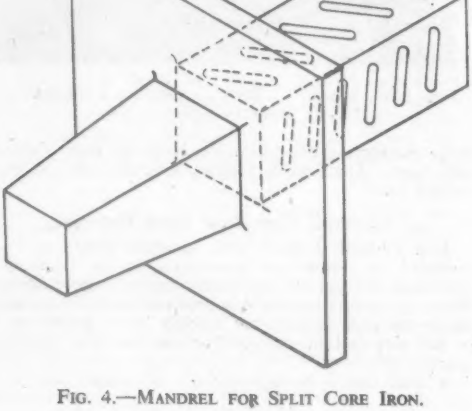

FIG. 4.—MANDREL FOR SPLIT CORE IRON.

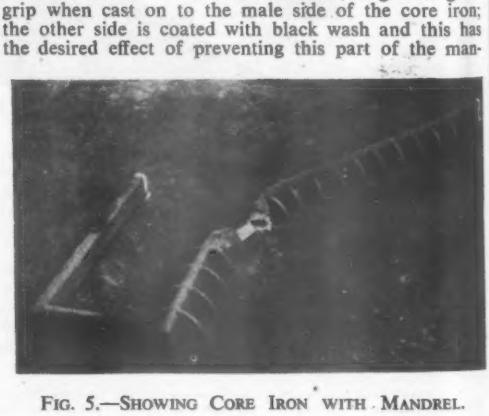

FIG. 5.—SHOWING CORE IRON WITH MANDREL.

drel from fusing under the wash of molten metal when the core iron is cast. Both sides are poured at the same time and when cold, the female side of the core iron is parted from the projecting end of the mandrel. A touch with the file usually ensures a perfect fit and completes the making of a very useful foundry tool (see Fig. 5).

Loam Patterns

In cylindrical work, such as pipes, the versatile jobbing shop often falls back on the use of loam patterns, and this method of moulding sometimes entirely dispenses with pattern work, except, of course, in the provision of suitable sweep sticks. Very rarely is the complete negation of the patternmaker accomplished!

The illustrations (Figs. 6 and 7) are self-explanatory, but, for the benefit of the uninitiated, some descriptive matter might be welcomed. The core is turned on a bar with straw-rope and loam and swept to shape or diameter by means of the sweep board. It is stoved and coated with blacking or any other material which, when dry, will make an efficient parting between the core and the loam pattern.

The pattern, to give the metal thickness, is run up in stiff loam using the appropriate board, and the whole re-stoved (see Fig. 6). The composite pattern superimposed on the core is thus used in the normal manner in ramming up the two-part box, after having fixed on any necessary wooden flanges. After the pattern is withdrawn from the mould it is a simple matter to break off the loam pattern portion and obtain a perfect strip from the core, which is replaced in the prints when the mould is ready to receive it. Fig. 7 shows the core over which is superimposed the loam pattern.

The shop which handles enamelling castings must be forever on the alert in co-operating with the enamelling department. As an instance, the case of moulding pipe bends which require eventually to be enamelled might be cited. The use of chaplets must be ruled out since their incorporation in the castings would, at the least, aggravate the enameller's difficulties. Chaplets could be eliminated by having two bends as one pattern, and thus the connecting print serving as a good anchorage for the core and preventing any movement during casting. Of particular moment, in this con-

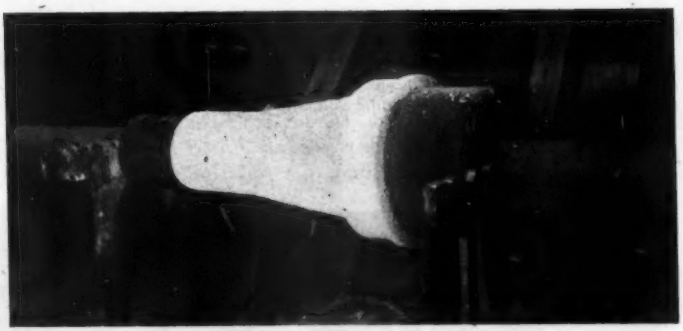

FIG. 6.—LOAM PATTERN SWEPT UP ON CORE.

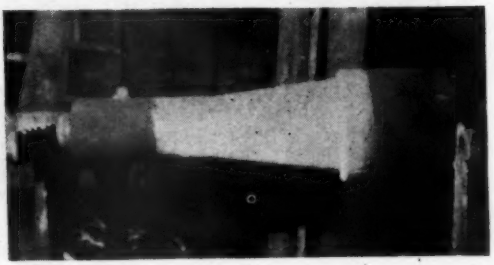

FIG. 7.—LOAM CORE BEFORE SWEEPING OF PATTERN.

FIG. 8.—GREENSAND SPUR WHEEL. SWEEPING FALSE BOTTOM FOR COPE.

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nection, is the method of running the castings; the type and amount of facings used on the mould, and the class of iron, are deciding factors in the enamellability of any casting.

Sweeping a Spur Wheel in Greensand

The casting about to be described is a wheel of 5 ft. 6 in. dia., with a rim 9 in. deep by 4 in. thick, and having 90 teeth at 2¼ in. pitch. The H section arms are formed by six oil-sand cores and, apart from this corebox, the only pattern equipment necessary consists of a top board, drag board, size stick and spindle.

FIG. 9.—GREENSAND SPUR WHEEL: SWEEPING DRAG.

FIG. 10.—GREENSAND SPUR WHEEL. COMPLETED MOULD PRIOR TO CLOSING.

Best Moulding Sequence

The best moulding sequence is first to level the drag and then to place and secure the centre for holding a 2-in. spindle. The drag is then filled level with the point and drag board placed and set to the proper diameter by means of the size stick. The top board is then placed above the drag board and firmly secured to the spindle. This top board is now used to sweep up a false bottom, upon which the top part of the mould is subsequently rammed (Fig. 8). In other words, a negative impression of the top part is obtained from the sweep board, and figuratively a positive imprint is obtained when the top part of the box is placed above this impression and rammed.

After lifting the top part, the sand is removed from around the drag board, while the latter is progressively swept round the spindle to give the final impression on the drag half (see Fig. 9). The finishing of the mould and placing of the six oil-sand cores is a straightforward business, and the cored-up mould, just prior to closing, is shown in Fig. 10. Although, in the case under discussion, the teeth are machine-cut, it is often more than desirable to core out the teeth, using a corebox with any number up to 14 or 15 teeth to the box. The use of a multi-toothed box is much to be preferred over the practice, common to some shops, of utilising many single-toothed cores in the one casting. Difficulty is seldom experienced in setting these cores; at the most a slight touch with the file will ensure a perfect fit when the circle of cores is complete. In extreme cases of misfit a slight alteration to the corebox will favourably alter things.

An experience with the running system used in the above casting is well worth recording. The more usual method is

to have in-gates on the periphery of the wheel and to run from the rim to the hub with risers on the latter, one on each side of the central core. Feeding rods are generally used on all runners and risers. Times there are when this method meets with more or less success. Fig. 11 shows the type of shrinkage defect commonly encountered. The Authors decided to try out experimentally the much publicised method of atmospheric pressure feeding, using the type

FIG. 11.—" SHRINKAGE " ON RIM OF SPUR WHEEL.

of "blind risers" with small pencil cores which Rominsky and Taylor described. Reference to Fig. 12 will make the arrangement easily understandable. The metal was introduced into the mould at the proper angle through the "blind" risers, which thus contained the last and hottest of the metal. The principal of utilising atmospheric pressure feeding is well known, and needs no reiteration here. It will suffice to say that from the first the success of this experiment was complete when applied to blank wheels of the size and nature described. It is the Authors' opinion that atmospheric pressure feeding could be with advantage more often introduced into ironfoundry practice if moulding boxes were made large enough to accommodate the riser patterns, and if foundry executives were more visionary in their approach to each job.

Cast Iron Still Section in Loam

One of the cardinal methods used in foundries engaged on large and circular work, such as retorts and pots, for the chemical engineering trade is the utilisation of loam moulds. It would be unwise to set limitations on the type or shape of castings which may with advantage be moulded in loam. Postulations are always dangerous in foundry practice. In the case to be described, since it was a "one-off" job, and since it could not, due to its peculiar shape, be swept up in loam in the orthodox manner, the decision to use a skeleton pattern and to mould it in loam is indicated. The section of this casting is 1 in. and the weight 2¼ tons.

The moulding routine is as follows:—After building the bearing and setting the pattern, the cope ring is placed in position. The building of the cope part of the mould round the skeleton boards is proceeded with in the usual way with building bricks, building loam and finishing loam all on top of the cope ring. The corners are swept to the proper contours by using suitable sweep sticks, and the flanges are backed by loam bricks or cakes. The use of loam cakes in this

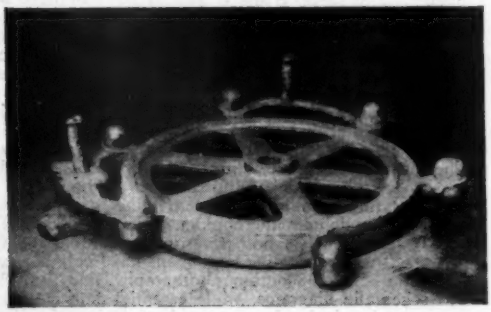


FIG. 12.—METHOD OF RUNNING WITH "ATMOSPHERIC" BLIND RISERS TO OBVIATE SHRINKAGE ON SPUR WHEEL RIM.

connection allows the mould at this point to yield better under contraction stresses, and permits easier and quicker stripping to be effected after casting. The boards may now be removed to allow the mould to be faced and finished.

By the removal of the completed cope the bearing is cleared to facilitate the re-assembly of the skeleton boards for the building of the cores. This is effected in a manner similar to that described above regarding the cope, but, of course, in this case the building is done on the inside of the pattern boards. The general idea of the method will be understood by referring to Figs. 13 and 14. The latter illustration shows the core in

(*Continued on page* 33, *column* 2.)

PUBLICATIONS RECEIVED

"Riveting of Wrought Aluminium Alloys." Published as Information Bulletin No. 8 by the Wrought Light Alloys Development Association, Union Chambers, 63, Temple Row, Birmingham, 2.

Despite recent developments in joining techniques riveting remains the principal method of joining aluminium alloy sheet. This booklet of 48 pages reviews for the first time in a comprehensive manner riveting practice for these light alloys. After a discussion on the correct choice of rivet alloys, identification of rivets and the types of rivets covered by B.S. 641:1935, and by the Society of British Aircraft Constructors, are described. The manufacture of rivets is then briefly dealt with. The design of riveted joints is discussed under the following heads: strength of riveted joints; shear strength of rivets; bearing strength of riveted sheets; tensile failure; edge distance; and riveting pitch. Drilling practice is covered in a separate section.

Riveting practice is dealt with in detail, and the hot driving of the larger sizes of rivets in duralumin-type alloy is described. Methods of rendering riveted plates pressure-tight are given. The correct choice of riveting tools, dollies, squeeze riveters, hydro-pneumatic squeeze riveters, pneumatic hammers and offset and extension fittings, is discussed. An important feature of the Bulletin is the attention paid to rivets for special purposes, such as tubular rivets, "pop" rivets, "Chobert" rivets, "de Bergue" rivets, explosive rivets, and cone-head rivets.

A special section is devoted to automatic riveting practice, while there are chapters on the inspection of riveted work and the mechanical testing of rivets. The heat-treatment of aluminium-alloy rivets is discussed in an appendix, and a select bibliography of the literature relating to the riveting of light-alloy assemblies concludes the booklet. The Bulletin, in the preparation of which both rivet manufacturers and the manufacturers of riveting equipment have collaborated, is illustrated by 38 action photographs, line drawings and schematic diagrams, while essential data covering, for example, single shear strengths for rivets in 2L37, lap and strap widths for large-scale riveting, sheet thicknesses for drill countersinking, safe design values for one rivet in single shear, and refrigerated storage times and temperatures for rivets to 2L37, are summarised in 13 tables.

Yearbook of the British Standards Institution, 1944-45. Published by the Institution from 28, Victoria Street, London, S.W.1. Price 2s., post free.

A careful study of this publication enables one to obtain a pretty clear picture of the trends towards standardisation by the various sections of industry. In general the participation of the foundry industry is somewhat meagre, but is increasing. This is important, as there is a very pronounced business angle which becomes apparent when the purchasing department use this book as a work of reference. The bulk of the annual is, of course, the subject index to British standards, which alone makes it an indispensable work of reference.

H.M.S. "ARK ROYAL'S" SILVER BELL

A silver bell to perpetuate the name of the aircraft carrier "Ark Royal" was cast at the foundry of Gillett & Johnston, Limited, Croydon, on December 10, 1943, in the presence of the First Lord of the Admiralty and a few officers and men of the "Ark Royal." The bell is now in position at the entrance to the wardroom of the Naval Air Arm Headquarters, and at midnight on New Year's Eve the traditional 16 bells was struck by the youngest officer of the station. The bell, suitably inscribed, is 19 in. in diameter at the mouth, and is cast in sterling silver, weighing over 2 cwts.

The decision to cast the bell followed a meeting of the maintenance committee of the aircraft carrier after her glorious service and heroic end in 1941, when the ship's company expressed the wish that such a bell should be made to perpetuate the name of the old "Ark." At the request of the ship's company the bell is to be kept in the custody of the Commodore of the headquarters of naval air personnel until a fourth ship bearing the same name is commissioned. So long as an H.M.S. "Ark Royal" serves with the Royal Navy the bell will be kept on board and passed on to her successors of the same name.

IRONFOUNDRY FUEL NEWS—XXXII

In view of the large number of foundries to be covered, most of the Regional Panels of the Ironfounding Industry Fuel Committee decided, when planning their programmes of visits to individual foundries, to start with the larger establishments in their respective areas. The bulk of these larger firms has now been visited, and the recommendations which have been made have, in numbers of cases, resulted in appreciable fuel economies. The contribution which the smaller firms can make is no less important in the aggregate.

The following instances show what has been done in two foundries in the West Midlands. At the first, the cupola bed height was considered by the visiting Panel members to be excessive, and the firm found, after judicious experiment, that they could actually reduce the weight of the bed coke from 17 cwt. to 11½ cwt. without any ill effects. The second firm was using a coke charge of 1 cwt. to an iron charge of 5 cwt. in a 24-in. dia. cupola, and here it was found that an immediate reduction of the coke charge to ¾ cwt. could be made.

Thus these two firms, between them, began to save coke at the rate of about 130 tons per annum.

The Institute of Metals give preliminary notice that their 37th annual general meeting will be held in London on March 14, 1945. The meeting place and programme will be announced later.

The Council of the Institute of Metals has unanimously agreed to award the Institute's Medal for 1945 to Dr. Richard Seligman in recognition of his outstanding services to the non-ferrous metal industries, on both the scientific and the industrial side. Dr. Seligman is a past-president and a Fellow of the Institute.

THE ELECTRIC ROCKING RESISTOR FURNACE

Attractive features of this type of equipment

By C. S. JOHNSON

This type of furnace has many desirable features in connection with the refining and superheating of high-duty and alloy cast iron. It is not, however, entirely confined to this sphere, and is used successfully in some non-ferrous foundries and also for melting steel for small castings. There is no local intense heat as with an arc furnace, the resistor heating the metal and furnace wall by uniform radiation from its whole length. A neutral atmosphere tends to be maintained in the furnace by the combustion of the resistor. The furnace is flexible, clean, and permits the accurate adjustment of composition and structure to any required degree. A general view of the furnace is shown in Fig. 1.

Briefly, the furnace consists of a refractory-lined cylindrical steel shell, mounted on four rollers with its long axis horizontal. A doorway is situated centrally for charging and slagging. The two ends are formed by cylindrical refractory slabs, which, in the case of a rammed lining, are rammed separately in a corebox. In the centre of each end is an aperture in which a copper or steel water jacket is inserted, and through which the carbon element or resistor passes. This resistor is held in a thick carbon block at either end, the block being in turn screwed on to a water-cooled holder. One of these blocks has a deeper hole in it than the other, and holds the resistor firmly; this is termed the holder block end when it needs changing. The other block has only a shallow hole in it, and the contact between it and the resistor is maintained by pressure alone, afforded by means of springs at either end of the furnace (Fig. 2).

The furnace works on a single phase current, and therefore, in order to have a balanced load, it is advisable to have a battery of three, where possible. The power consumed is 150/180 kw. per hr., taking a current of up to 5,000 amps. at a pressure which can be varied by means of a transformer tap changer, from 32 to 61 volts. A heat of 1,000 lbs. of pig-iron and scrap can be raised to 1,450 deg. C. in two hours approximately, starting from the cold, using some 400 kw.-hrs. The average power consumption for each ton of iron melted is 900 to 950 kw.-hrs.

The furnace is tilted for pouring by means of a power driven cog wheel engaging with a rack on the body. It is capable of being automatically rocked backwards and forwards through an arc of some 120 deg. Both tilting and rocking may be done at either of two speeds. Whether much mixing of the metal is obtained while the furnace is rocking, is doubtful, but heat is conveyed more rapidly to the metal, as in addition to heat radiated directly on to the metal surface, the hotter roof goes underneath the metal and imparts its excess heat by conduction. The furnace may be tilted for pouring out very small amounts of metal, say into hand shanks, as easily as for pouring out larger amounts. The capacity of the furnace is usually from 600 lbs. to 1,200 lbs. of molten cast iron.

FIG. 1.—THE FURNACES OF HEPWORTH & GRANDAGE, LIMITED. A BATTERY OF THREE IS IN OPERATION THERE.

Rammed Lining Recommended

As in the case of most furnaces, either a bricked or a rammed lining may be used, the latter being, on the whole, more satisfactory. The roof of the furnace, in particular the part which does not come into contact with the metal, is subject to quite severe conditions, as it receives the full heat radiation from the resistor and attains a temperature above that of the bath.

The Electric Rocking Resistor Furnace

Because of this there is a tendency for the roof to become thinner, and at the same time slag accumulates round the metal level in the bath. This building up of slag in the lower half of the furnace reduces the amount of metal it will hold, and may be corrected by adding a very small amount of soda ash with each charge. The lining found most suitable for melting cast iron is of rammed ground ganister.

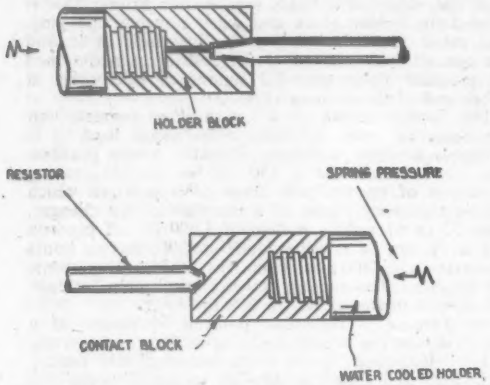


FIG. 2.—SHOWING METHOD OF HOLDING RESISTOR.

The furnace may be used for melting up pig metal and scrap from the cold, but its special field is in the duplexing and superheating of cast iron. The shape of the furnace with its narrow door and central, fragile resistor make it rather a tricky job to charge up with cold material. It is feasible to expect that if a compound hot metal charging spout and a pouring spout were designed, furnaces of this type could be situated directly in front of a cupola and used as a mixer. In this case the furnace would be tilted right over backwards to receive the metal, and would be tilted forward for pouring in the usual manner. Used in this fashion with only small quantities of cold additions, if any at all, the furnaces would be able to be designed to have a much larger capacity with the same power input.

A reasonable life for a lining, when being used solely for duplexing cast iron, is in the region of 1,000 heats, which is equivalent to approximately 450 tons, and, when on duplexed charges during the daytime and cold melted pig-iron and scrap at night, a life of from 600 to 800 heats, equivalent to about 320 tons, should be obtained. It is difficult, but not impossible, to patch the furnace lining, this being done preferably by means of sintering thin layers of silica sand on to the thin part. Ganister does not stay on when applied to a hot lining, and only stays on occasionally when applied to a cold lining. The latter procedure causes a serious interruption of production unless it can be accomplished when the furnace is not in use, say at the week-end. To obtain the best lining performance it is, of course, necessary to dry a new one very slowly and thoroughly by means of a coke fire, and not by means of the electric current. In order that there should be the least possible amount of time lost when a lining requires renewing, it is advisable to have a spare shell lined and dried in readiness. Changing the lining, then, becomes a simple and relatively speedy operation, it being necessary to remove the end only from the body in use, lift it off the rollers and drop the new one into position. After bolting on the ends again, this should then be cautiously heated up to its working temperature. When this temperature is reached, the first material to be charged should be a quantity of cupola slag, to glaze the surface of the lining and to knit it together. After rocking the furnace to spread the slag all over, the excess slag is run off and the first charge of metal may then be introduced.

FIG. 3.—ILLUSTRATING THE FURNACE END AND RESISTOR WITHDRAWN AS FOR RENEWAL. NOTE THE BLOCK AND TACKLE, WHICH TURNS ON A MONORAIL, SUPPORTING THE END.

The maximum safe temperature to which the furnace can be raised, with a lining of rammed

ganister, is about 1,550 deg. C. This is sufficient to melt and superheat most alloys, including nickel-chromium heat-resisting alloys. It must be added, however, that, if installing a furnace were contemplated, to melt the latter alloys solely, it would be advisable to have a more refractory lining, and probably one of a basic nature.

With regard to resistor and block consumption, the average life of a resistor on duplexing cast iron with additions of about 100 lbs. of steel and alloys to 800 lbs. of molten iron, is about 8 to 10 heats, and that of the blocks, 30 to 40 heats. With cold metal the consumption is somewhat greater, and the life is about 6 and 20 respectively. Expressing this as a weight, the consumption is roughly 3½ lbs. per ton of iron duplexed and 6 lbs. per ton of iron melted.

Small Melting Loss

The furnace naturally cannot compete with a cupola with regard to melting cost, but it is ideal for incorporating alloys, there being very little melting loss and no pick up. Pig-irons and scrap blended to give 3.35 per cent. and 2.4 per cent. Si gave about 3.25 per cent. C and 2.3 per cent. Si in the resulting castings. There is a loss of manganese to the extent of approximately 0.1 per cent. The melting loss is not wholly due to atmospheric oxidation, but is due in large part to the rust on the pig-iron and scrap charged, the effect being similar to that obtained by the intentional addition of iron ore in steel-making. Alloy additions may be made with either high-alloy pig-iron or ferro-alloys, the former method giving the most satisfactory results. Desulphurisation by means of soda ash is impracticable in the furnace itself, but this may be done in the transfer ladle, prior to the entry of the metal into the electric furnace when duplexing. In the Author's experience, the furnace has been used successfully for melting all types of alloy cast irons, 60 per cent. Ni, 20 per cent. Cr, 20 per cent. Fe, and high chromium heat-resisting alloys, also high silicon, high chromium and high molybdenum alloy pig-irons.

The temperature of the metal in the furnace is accurately controllable, but, unfortunately, it is difficult to take a reading of the temperature of the metal while it is actually in the furnace and a sample must be poured out. It may be possible to control the atmosphere in the furnace, which will no doubt be useful in some cases.

In conclusion, the Author wishes to thank Hepworth & Grandage, Limited, for their kind permission to publish the facts and photographs contained in this article.

METHODS AND PROBLEMS INDIGENOUS TO A GENERAL ENGINEERING IRONFOUNDRY

(*Continued from page* 29.)

the casting pit after having been stoved, and shows what is, perhaps, the only point worth commenting upon in this connection, that is, although in circular loam cores, no support other than the building brick is required. In these irregularly shaped cores two single courses of bricks are necessary to prevent the walls from breaking in under the ferrostatic pressure of the molten iron.

Whilst the cope and core are being stoved the top part is prepared by skinning a 1 in. thick layer of loam on a suitable top ring. Drop gates are cut through holes cored in this ring at suitable positions. Fig. 15 shows the assembly of the completely dried and finished mould. The above is, naturally, only a description of the method in broad outline, and it will be generally realised that in work of this kind the skilled loam moulder adds his modicum of variants garnered from personal experience, and that practice is bound to differ in detail from foundry to foundry.

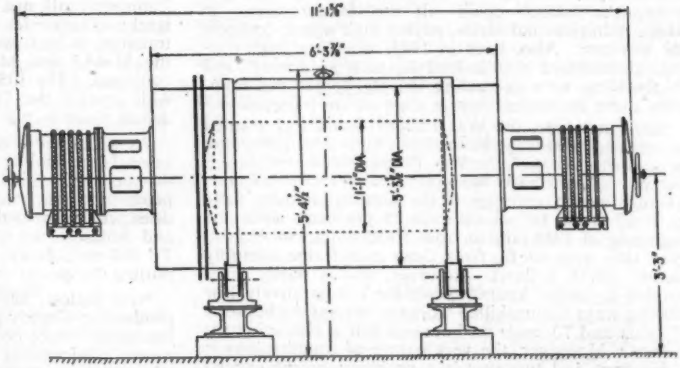


FIG. 4.—GIVING THE MORE IMPORTANT DIMENSIONS OF THE 1,200-LB. FURNACE.

In jobbing work, very often the main considerations are those of production speed and price. The one is usually expected to vary inversely as the other. This statement is not axiomatic unless production speed is linked with the surety of good workmanship. Economy cannot be effected by the speedy production of wasters. Nevertheless, the occasion arises when, in deciding whether to make a casting in greensand, dry sand or loam, the scales are necessarily heavily weighted in favour of greensand production.

(*To be continued.*)

THE AMERICAN FOUNDRY INDUSTRY

Mr. Hiland G. Batcheler, the Chief of Operations at the American War Production Board, in an official report makes the following references to the foundry industry: Recently the War Production Board turned over to the WMC a plant by plant statement of requirements for 10,000 additional workers in 170 critical foundries. The foundry industry is a problem all its own, and is taken up in the following discussion:—

The foundry and forge industries cut across virtually the entire critical list—forgings and castings are used in combat loaders, artillery, ammunition, heavy-heavy trucks, aircraft, tanks, etc. The problem splits into two parts: (1) Labour; and (2) identification and distribution.

The wartime foundry and forge industries are concentrated at Chicago, Cleveland, Detroit, and the Milwaukee-Racine region—all are labour areas in which munitions industries, paying high wages, compete for workers. Also, back in 1943, when the high-paying, glamourised war industries, such as aircraft and shipbuilding, were expanding sharply, forges and foundries came out second best in the race for man-power.

Since that time, the War Labour Board has granted more than 1,000 wage increases in individual cases and, in co-operation with the War Production Board, incentive pay systems have been installed wherever possible. Average weekly earnings in the foundry industry have gone up from 10 per cent. to 25 per cent. since the beginning of 1943 (and at from 50-52 dollars in August, 1944, they were not far from those in airframe assembly plants: 54.73 dollars). However, this is partly attributable to longer hours. Also, the comparatively low starting wage for unskilled workers—averaging between 65 cents and 70 cents an hour—is still a restricting influence. Moreover, the very nature of foundry jobs is a deterrent and turnover is a problem; recent experience shows that only about one out of every four new workers stays on the job three months or more.

On top of that, the armed forces drained workers, and are still cutting into labour supply. Although workers in critical plants are supposed to have preferential treatment in selective service, local boards do not always follow instructions. Moreover, an agricultural worker who wants a seasonal job in a forge shop or foundry may lose his draft deferment. All told, the industry could use about 16,000 additional workers in some 300 critical forge shops and foundries. Present employment in these plants is approximately 178,000.

Right now, the War Production Board is trying to get a restatement of the essentiality of foundry and forge workers. Further, the Army and Navy are now working on a plan to furlough a selected number of men to the forge shops and foundries. And several thousand Jamaicans and Barbadians have been made available to the industry now that their farm work on the War Food Administration programme has run out. However, there were few takers. Housing is a problem, but is being provided. Moreover there is prejudice against foreign workers in certain local committees and labour unions.

Tanks

Tanks have a strong comeback in the Army supply programme. Whereas production early this year had been pared down to about 1,200 per month, requirements have been increased, and by the end of this year nearly 2,000 a month are scheduled. However, tanks are on the critical list not so much because of the step-up, but because of changes in basic design.

The trend has been toward greater firepower and mobility. Early this year, medium tanks with the 75 mm. gun were superseded by the 76 mm. gun and the 105 mm. howitzer. Also the M-24 light tank was brought into the programme. At the present time, the big deficit is in the M-4A3 with the 76 mm. gun. It fell 205 behind schedule in September, and 203 behind schedule in October. The deficit traces to two important design changes: 1, a new type of suspension, and 2, a wider track—from 16 inches to 23 inches. Ultimately all medium tanks will roll on the wider track; it provides better balance and offers greater traction, in both wet and dry terrain. Currently only the M-4A3 and M-4 with 105 mm. howitzer are so equipped. The 105 mm. howitzer gets first call on the wide tracks; the 76 mm. gets the residue; hence the deficit tends to pile up in the 76 mm.

As a further factor, the Chrysler and Fisher tank arsenals are tooling up for a heavy tank of new design, deliveries of which are scheduled to start now. The production job is to get sufficient man-power in foundries and to train the man-power in casting these new and wider tracks. To date, rejections have run high. To this end, Army Ordnance and War Man-power are putting on special drives to get the necessary help.

Nevertheless, actions taken and the momentum in production already gained assure a fairly rapid step-up, but goals cannot be met without alert attention to man-power requirements in foundries. A plant by plant list of man-power requirements has been submitted to the WMC. Further, the War Production Board has arranged to schedule production of critical castings for tracks and armour.

NEW CATALOGUES

Mechanised Foundry Plant. Foundry Equipment, Limited, of Linslade Works, Leighton Buzzard, Beds., have just issued a new catalogue, M.M.32, which deals with the above subject in considerable detail. Moreover, it carries six pages of interesting illustrations, covering both plant items and typical complete installations. The reviewer was particularly pleased with the final conclusions, wherein potted advice is given to the foundryman as to the part he must play in making a success of mechanised casting production. Of new matter described and illustrated is a sand disintegrator. It is of the rapidly revolving disc and pin type. The brochure gives information on knock out grids, sand mills, sand reconditioning, mould conveyors, and core shop practice.

THE METALLURGIST IN THE FOUNDRY

By W. H. SALMON, A.Soc.Met.

In a lecture given to the Sheffield Metallurgical Association, on October 10 last, Mr. W. H. Salmon, Senior Vice-President of the Sheffield Branch of the Institute of British Foundrymen and secretary of the Foundry Practice Sub-Committee of the Iron and Steel Institute, said that the foundry metallurgist has four duties. He selects a suitable chemical composition to provide the physical properties demanded by the designer; he provides molten metal of the correct composition and fluidity, free from slag, or oxide scums, and low in harmful impurities; usually he is something of a geologist, experienced at any rate in the sands, clays and organic binders suitable for foundry moulds, and he is experienced in heat-treatment schedules, stress relieving, annealing and the more complicated treatments involving rapid cooling. The lecturer said he had time to deal with only one aspect of the activities of the foundry metallurgist, the molten metal and factors which affected its behaviour in the moulds.

Castings were made in many metals and alloys, an overwhelming tonnage in cast iron, lesser proportions in steel and non-ferrous alloys. The foundry metallurgist does not confine his studies to one class of metal, but is interested in the methods developed by metallurgists in other types of foundries in providing suitable molten metal, because the work done in other branches often provides the solution to some of his own problems.

Relative Costs of Castings

The production difficulties, the equipment required and the cost of the raw materials affected the selling price of castings; for instance, a casting of simple design, without cores, costs four times as much in carbon steel as in grey iron, six times as much in light alloys, and up to twenty times as much in corrosion- or heat-resisting steels, depending on the alloy content.

It is natural that metallurgists think mainly of ingot production, but they realise that molten metal to be poured into green-sand or dry-sand moulds should possess characteristics somewhat different from metal cast into chill moulds. The slower rate of solidification, the intrusion of mould gases and moisture tended to upset the gas-equilibrium condition of the molten metal, which therefore is provided with a reserve of deoxidant to allow for the different conditions entailed in sand casting. Illustrations showed the effect of small increments of deoxidisers in preventing subcutaneous blowholes in castings. The similarity in the methods adopted to remove hydrogen in melting ferrous and copper alloys was noted. An interesting sidelight on the influence of hydrogen evolved from the coating of welding electrodes in causing cracks near welds, and the beneficial effect of heating the coated electrode to a temperature of 650 deg. C. before use, had been reported recently.

Influence of Elements on Fluidity

The primary function of the foundry metallurgist was to provide liquid metal, which would give sound castings. It was important that the metal should possess adequate fluidity to fill the mould at a sufficiently rapid rate. Fluidity depended on three factors, chemical composition, casting temperature and melting conditions. For instance, the fluidity of cast iron, steel and aluminium improved as the silicon content was increased. The fluidity of cast iron could be improved still further by additions of phosphorus. Although this element tends to make the castings brittle, the addition enabled thin sections to be cast and the castings were eminently suitable for the service requirements. For special chromium cast iron in which both the silicon and the phosphorus contents had to be kept below critical limits, the moulds were made very near to the oil-fired crucible furnaces in which the temperatures were carefully controlled by means of immersion pyrometers, and no time was lost in transferring the liquid metal from the crucible to the mould. Similarly in light metal founding, the rigid control of melting temperature was of paramount importance, strict limits of casting temperature were specified for individual designs.

The influence of melting conditions in impairing the fluidity of molten metal were compared for ferrous and non-ferrous metals. The fluidity of molten metals was a potent factor in controlling hot tears in castings, and the lecturer considered that much trouble was caused in foundries by metal which lacked this property.

Hot Tears

Another factor which had a great influence on hot tears in castings was the type of grain boundary inclusions. The strength of a crystal structure at high temperatures depended to a large extent on the form and extent of these inclusions. It is well known that the sulphur content is a critical factor in the production of a thin-walled steel casting. In cases where the addition of elements to improve the fluidity of the metal tended to cause brittleness on account of their tendency to produce a gross structure, the metallurgists had realised that if the intricate designs were to be produced economically, this disability had to be overcome. Examples were given of the skill which had been shown in this direction by metallurgists in light alloy, non-ferrous, and cast-iron founding.

The amount of feeder head necessary for various metals showed considerable variation. The art of the founder was employed to ensure that castings were free from shrinkage defects, and he employed numerous devices to ensure that directional solidification could take place in the mould, so that a reserve of fluid metal remained in the feeder heads as the body of the casting was freezing. On account of the lower melting points of non-ferrous and light alloys, it was possible to use chill moulds to a far greater extent than for cast-iron and steel founding.

(*Continued on page* 37, *column* 2.)

Company Meeting

HALE & HALE (TIPTON), LTD.

CHAIRMAN'S REVIEW

The eighth annual general meeting of Hale & Hale (Tipton), Limited, was held on December 29 at Dudley, MR. W. EDGAR HALE, J.P., T.C., M.I.Mech.E., M.Inst.F. (chairman of the company), presiding.

The chairman, in the course of his speech, said:—

The trading profit, together with sundry other items, amounts to a little over £25,000, as compared with approximately £22,000 for last year, showing an improvement of roughly £3,000. Your directors decided that an interim dividend of 5 per cent. on the ordinary share capital should be paid during the year, and they further proposed that a final dividend of 10 per cent. should also be paid. Your directors have decided upon this increase in dividend to compensate the proprietors for the conservative returns they have received out of the company's trading in past years.

Burden of Taxation

Your company, the same as every other trading concern, has been called upon to pay out in taxation practically everything that it earned over its pre-war activities, in addition to which, of course, the increased rate of income tax is a heavy burden, but in spite of all this, no one has a right to complain. Those who are engaged in the Fighting Forces are called upon to endure untold hardship, and surely no one has any right to complain of financial hardship. For all that, it is incumbent upon the Chancellor of the Exchequer to pay due regard to the financial aspects of industry so as to ensure that the financial impoverishment of industry is not going to impair our national peacetime effort, and there are very welcome signs that this aspect is not being overlooked by the powers that be.

As to the works and the general production therefrom, during the year we have made decided scientific advances which have carried the standard of quality in the industry to a higher plane than we believe it has ever approached before. Your directors feel they are justified in claiming that your company's production stands second to no other. The industry will undoubtedly benefit in peacetime from the fact that during wartime exceptional demands have occasioned substitution of "Blackheart" malleable iron for other hitherto popular raw materials, with most gratifying results to all concerned, and engineers in the future will undoubtedly specify the use of "Blackheart" malleable iron on a much larger scale than ever has been known formerly.

Your organisation has had the compliment paid to it on numerable occasions of being asked to give technical advice on matters of first-rate national importance, both by Government departments and industrial concerns, which advice has been willingly given.

Post-War Prospects

Your company has a very heavy order-book indeed and is in the enviable position of having throughout the war period supplied the bulk of its tonnage of output to its old peacetime friends, and happily, too, the company will not be confronted with a difficult change-over period from war to peace, as the company's production does really not vary from one to the other.

Your technical staff is continually engaged upon the development of new uses and outlets, which are producing very good results indeed. We welcome the opportunity of analysing the problems of our users and potential users and we find our services are proving very acceptable in this connection. Your company has for sale a really first-class product, backed by a sound working organisation and an excellent technical staff. It is not unduly optimistic to look forward to an era of continuous development.

Your directors feel equally optimistic in relation to the two subsidiary companies in respect of their peacetime prospects. The larger of the two, that is, Chatwins, Limited, is an old-established business of repute, manufacturing, in the main, household grates and ranges under the trade names of "Sunbeam," "Sunbeamette," and "Eezikleen," all of which have an excellent reputation amongst users and also amongst the factors and wholesalers, through whom the company exclusively sells its products. In addition, it is intended to devote attention to a number of other branches directly concerned with house building which, collectively, should provide that company with a good many years of prosperous activity for all concerned. The smaller of the two, that is, J. & J. Whitehouse (Tipton), Limited, is again an old-established concern producing what is known as the "Phœnix" brand of hollow-ware and similar products, mainly for export, and for which there is every reason to anticipate a good, flourishing demand.

Government's Part in Industry

I have referred on previous occasions to the danger that might arise to industry, and the inevitable subsequent impoverishment of the people if the amount of political "hot air" that one hears of and reads so much about, is ever likely to become a serious factor in our national affairs. Irresponsible people seek to impress the body of the people that by some illusionary change in the political and economic arena there will be easy living without work for all and sundry.

It is only too obvious that such never can be the case. All the social developments and advancement which all right-thinking people are so enthusiastic about, should be brought into being at the earliest possible date, but this can only be the outcome of serious and hard work by those sections of the community that are neither too young nor too old. Both the young people and the elderly people, as I have said on numerable occasions, have a right to accept peace and comfort at the expense of the people of medium age, and, to enable that to be achieved, industrial life must stand upon a healthy foundation of keen individual effort. At no time must the benefits of industry be regarded as a special prerogative of the proprietors of industrial concerns. An industry must at all times arrange its affairs on such a basis that

reasonable equity exists between all the complex claims which different sections of the community have a right to make upon it. There are undoubtedly many needs for very beneficial and considerable changes to be made; but let us be sure before indulging in them that adequate care and thought have been given by responsible and honourable people.

Question of Ownership

Undoubtedly some industries have grown to such dimensions and have acquired what may well be termed public and national proportions, that national or municipal ownership, in some form or other, is apparently desirable; but let us not plunge headlong into these advanced schemes unless every possible care is exercised and, further still, let us not forget the pioneers of these industries who, over a period of many years, fought intense battles in the channels of scientific research, finance, organisation, etc., which always were, and always will be, the pioneer's nightmare.

Industry has shown itself to be a very delicate plant and can only be fostered with great care and foresight by trained and responsible individuals, free from the deadening hand of bureaucracy.

There is much to be read and heard in these days on the pros. and cons. of post-war control of industry by Government departments. I lean myself towards the view that the Government must in the future take a more constructive interest in post-war industry than ever has been the case hitherto, and not regard it as a convenient channel for the Chancellor of the Exchequer to secure funds, but this interest must be exercised by a new type of civil servant, who is a hybrid between a trained civil servant and a trained industrialist, agriculturist or scientist, according as the case demands. Personally, I have every confidence that British industry will prosper greatly when peace once more comes. "British and Best" have been synonymous for generations when referring to industrial products, and I am sure that that position will be maintained.

The report was adopted.

NEW TRADE MARKS

The following applications to register trade marks appear in the "Trade Marks Journal":—

"MAGNABOND"—Moulding powder for use in foundries. WILLIAM CUMMING & COMPANY, LIMITED, Kelvinvale Mills, Maryhill, Glasgow, N.W.

"ELGA" (AND CIRCULAR DEVICE)—Welding machines and apparatus. AKTIEBOLAGET EL- & GASSVETSNING, c/o Edwin C. Axe, 27, Chancery Lane, London, W.C.2.

"SIGMATIC" AND "AQUAMATIC"—Rotary, centrifugal, reciprocating, and diaphragm pumps. SIGMUND PUMPS (GREAT BRITAIN), LIMITED, Team Valley, Gateshead, 11, Co. Durham.

"NEOCOL"—Oleaginous liquids containing metal particles in suspension, for use in testing ferrous metal bodies for flaws or imperfections by means of magnetic testing apparatus. HAWKSLEY'S STAINLESS, LIMITED, Burdall's Buildings, Langsett Road, Sheffield.

IRON-ORE BRIQUETTING PROCESS

U.S. patents covering a process of briquetting soft iron ores, concentrates, flue dust, or similar material, to produce a dense, compact suitable for open-hearth or blast-furnace charging have lately been issued. This process comprises drying the ore material and subjecting it to briquetting pressures sufficient to compress and compact it, and increasing the strength of the resulting briquettes by heating them until they are case-hardened or incipiently sintered. An alternate process presses the fine dried ore into containers for furnace charging. Experimental briquettes have been produced which can be substituted for high-grade lump ore suitable for use as an oxidising agent in the open-hearth furnace or for open-hearth charging. Those made from several different ores withstand rough handling and have a specific gravity of 4 plus. Compared with loose ores, they permit a freer circulation of the blast through the charge; dust losses are cut down; and the dense nature of the briquettes permits delivery of a greater quantity of iron units to the hearth. Dehydrated briquettes require no drying in the blast furnace, whereas the moist ores require and use extra heat from within the furnace. The briquettes described appear complimentary to, rather than competitive with, sinter. The percentage of sinter in a blast furnace is usually limited by its porosity. Finest ore sizes are best suited for briquetting. Concentrates finer than 100 mesh, should make ideal briquetting material.—("Engineering and Mining Journal.")

Since 1941 the membership of the [American] Gray Iron Founders' Society has increased from 183 to 730.

Mr. Thomas Kaveny, Jr., of the Herman Pneumatic Machine Company, Pittsburg, has been elected president of the [American] Foundry Equipment Manufacturers' Association.

THE METALLURGIST IN THE FOUNDRY

(*Continued from page* 35.)

Illustrations were given of methods of gating used by foundrymen to separate the slag and deoxidation products from liquid metal before it entered the actual mould cavity. The precautions which had to be taken varied with the comparative density of the metals and their slags.

The lecturer thanked the directors of Hadfields, Limited, for permission to give the lecture, and his friends in the foundry industry for their interest in providing illustrations of their work.

A lively discussion followed, in which Mr. R. Staton (President of the Sheffield Metallurgical Association), Mr. G. Parkin, Dr. Gregory, Dr. Jay, Mr. Malcolm Brown, Mr. Munro, Mr. Chadwick and many other members and visitors showed keen interest. In reply, the lecturer assured the metallurgists that foundrymen always appreciated their assistance in those problems which could be solved only by close co-operation under practical conditions.

NEWS IN BRIEF

HARROW MACHINE TOOL COMPANY, LIMITED, is being wound up voluntarily. Mr. N. S. Hunt, 15, Cromwell Road, London, S.W.7, is the liquidator.

TURNER & NEWALL, LIMITED, have under consideration detailed expansion schemes entailing expenditure of over £1,500,000 on capital account within two years.

THE SPECIAL MEETING of the stockholders of Richard Thomas & Company, Limited, held in London on December 29 approved the proposals for the merger with Baldwins, Limited.

PROPOSED NEW RULES to be submitted for approval at the annual meeting of the Sheffield Metallurgical Association on January 20 provide for the admission of women to membership.

DURING THE PAST YEAR the employees of the Mirrlees Watson Company, Limited (engineering and foundry departments), subscribed £812 towards the Red Cross and various charitable institutions.

ON COMPLETING 60 years' service with Bairds & Dalmellington, Limited, Mr. Robert Guthrie, moulder, has been presented with a gold watch. This is the 22nd such presentation to be made during the past eight years in the Dalmellington branch of the firm.

A NEW COMPANY, Lomax & Smith, Limited, has purchased ground on the outskirts of Dundee to erect a factory to carry on light engineering work. The principals of the firm are Mr. John Lomax, engineer, Broughty Ferry, and Mr. R. H. Smith, chartered secretary, Broughty Ferry.

BAR SILVER will in future be quoted on the London bullion market in pence per ounce Troy 0.999 fine, instead of in pence per ounce standard, that is per ounce Troy 0.925 fine. The change is being made largely with a view to the post-war market. London is the only market where silver is quoted per ounce standard.

ANTIMONY PRICES REDUCED

As from January 1, there is a reduction in the prices of the antimony metal and the antimony compounds sold on behalf of the Ministry of Supply by the Cookson Lead & Antimony Company, Limited, Newcastle-upon-Tyne; St. Helens Smelting Company, Limited, St. Helens; and Hallett & Son, London. The reduced prices are as follow:—

Antimony metal, 99.6 per cent., £112 10s. per ton; antimony metal, 99 per cent., £105; antimony oxide, £105; crude antimony, £90.

MR. L. W. BOLTON is leaving the British Cast Iron Research Association to join the staff of John Gardom & Company, Ripley, Derbyshire. Mr. Bolton joined the Association's staff in 1924, and for the past seven years has been in charge of the development department.

CONTROL OF EXPORTS

RELAXATIONS UNDER NEW ORDER

The Export of Goods (Control) (No. 3) Order, 1944 (S.R. & O., 1944, 1424, price 1d.) made by the Board of Trade on December 22, 1944, and operative as from January 1, 1945, makes certain relaxations in the control of exports.

The following goods have been removed from the schedule to the Export of Goods (Control) (No. 10) Order, 1943, and consequently require licences only when exported to those destinations to which the export of all goods is controlled.

Iron and steel (including alloy steel) in the following forms:—Castings and forgings, but not including machinery parts; stampings and pressings with or without rolled edges, but not including machinery parts.

Manufactures wholly or mainly of non-precious metal, the following:—Animal (including vermin) traps; architectural and decorative metalwork; articles of a kind commonly used in connection with the serving of food or drink, including waiters, stands, frames and holders; bells, bell domes and bell gongs; coffin furniture and fittings; domestic implements of the kind commonly used for the preparation of food and drink; knives, scissors and parts thereof; razors; dog appliances and fittings; forks and spoons; golf clubs, steel shafted; harness and saddlery and fittings; producer-gas units of a kind used for operating motor vehicles.

The item "Hollow-ware" (under the heading "Manufactures wholly or mainly of non-precious metal") in the Schedule to the Export of Goods (Control) (No. 10) Order, 1943, has been amended.

OBITUARY

MR. BERNARD WINNARD, partner in the firm of T. Winnard & Sons, engineers, Washford Road, Sheffield, died recently, aged 61.

MR. FREDERICK WILLIAM BARKER, founder and chairman of Barker & Aspey, Limited, ironfounders and engineers, Hull, died recently, aged 75.

MR. GEORGE MARTIN MANSFIELD, a director of James G. Crowther, Limited, Heeley Brass Foundry, Aizlewood Road, Sheffield, died suddenly. He was 63.

MR. ALBERT EDWARD PRICE died at Wolverhampton recently at the age of 82. He had been works manager for 35 years of the safe department of James Gibbons, Limited, Church Lane, Wolverhampton.

SIR CHARLES SHERITON SWAN died at his home at Stocksfield on December 30, aged 74. Chairman of Swan, Hunter & Wigham Richardson, Limited, shipbuilders, of Wallsend, and also chairman or director of several other companies, he was knighted a year ago.

MR. THOMAS SMART SHORT, chairman of Short Bros., Limited, Sunderland, shipbuilders, and the Sunderland Gas Company, Limited, died recently. He was a member of the North-East Coast Institution of Engineers and Shipbuilders and a Fellow of the Institution of Naval Architects. He was 70 years of age.

THE MODERN PIG

IF YOU WANT...
clean iron, free from sand, free from sows ...uniform analysis... convenient size...easy handling... specify
STANTON MACHINE CAST PIG IRON

SPECIFICATION

WEIGHT	80-90 lbs.
Length	22 inches
Width	8½ inches
Thickness	3¾ inches

(at notch 2½ inches).

Made in our well-known

STANTON, HOLWELL & RIXONS BRANDS

THE STANTON IRONWORKS COMPANY LIMITED NEAR NOTTINGHAM

PERSONAL

CAPT. H. VIVIAN has been elected a director of Associated Electrical Industries, Limited.

SIR GEORGE BINNEY has been elected a director of the United Steel Companies, Limited.

MR. S. C. SEWARD has been appointed a director of Wellworthy Piston Rings, Limited.

MR. D. P. C. NEAVE has been elected to the board of the Imperial Smelting Company, Limited, and appointed a joint managing director.

MR. A. R. CHAPMAN, who has been deputy general sales manager of Babcock & Wilcox, Limited, since January 1, 1944, has been appointed general sales manager as from New Year's Day.

MR. CLIFFORD CARNELL, who has been associated with Arthur Balfour & Company, Limited, Sheffield, for 35 years, and has acted for some time as London director, has been elected to the board of directors of the company.

MR. W. EDGAR HALE, owing to ill-health, has relinquished the office of managing director of Hale & Hale (Tipton), Limited, but remains chairman of the company. He is succeeded as managing director by MR. R. C. LEPPINGTON, vice-chairman of the company.

MR. N. G. LANCASTER, with the consent of the directors of Fisher & Ludlow, Limited, has accepted a partnership in the firm of Howard Smith, Thompson & Company, chartered accountants, and has resigned from the board. Arrangements have been made whereby Mr. Lancaster's services will be available to Fisher & Ludlow, Limited, in a consultative capacity.

MR. HENRY REES HUMPHREYS, a director of Cammell Laird & Company, Limited, Birkenhead, has been appointed a director of the English Steel Corporation, Limited. Mr. Humphreys joined the Birkenhead works as an engineering apprentice, and served as an engineer-officer in the Royal Navy during the last war. He became manager of the repair and reconstruction department in 1931, was appointed a local director in 1940, and assistant to the managing director and a director of Cammell Laird & Company, Limited, in 1943. Mr. Humphreys will also be appointed to the board of Firth-Vickers Stainless Steels, Limited.

Wills

JACKSON, W. F., of Sheffield, retired file manufacturer £38,272

GLASS, D. J. C., late chairman, Central Provinces Manganese Ore Company, Limited £750,250

WILKINSON, ABEL, of Great Harwood, Lancs, a director of L. Wilkinson & Sons, Limited, engineers and ironfounders, and of James Bond, Limited, Belmont Foundry, Longridge, Preston £20,822

DOCKER, F. DUDLEY, of Amersham, Bucks, one of the founders and first president of the Federation of British Industries, director of the Birmingham Small Arms Company, Limited, and other companies £887,692

TURNER, P. J. D. S., of Pyrford, chairman of the Metropolitan-Vickers Electrical Export Company, Limited, managing director of Associated Electrical Industries, Limited, and a director of the British Thomson-Houston Company, Limited, Edison Swan Cables, Limited, Ferguson, Pailin, Limited, and other companies £86,430

COMPANY RESULTS

(Figures for previous year in brackets.)

Thomas Bolton & Sons—Interim dividend of 2½% (same).

Joshua Bigwood & Son—Dividend of 5%, making 10% (same).

Engineering & Lighting Equipment—Interim dividend of 3% on the ordinary shares (4%).

Beralt Tin & Wolfram—Interim dividend of 5% (same) in respect of the year ending March 31, 1945.

Henry Meadows—Second interim dividend of 17½%, less tax, which later will be confirmed as the final dividend for the year.

Irish Aluminium—Trading profit for the year to September 30, £3,092; ordinary dividend of 6½%, less tax, at 7s. 6d.; forward, £2,871 (£2,712).

David Brown & Sons (Huddersfield)—Profit, after charging depreciation and making provision for E.P.T., £237,411 (£206,739); dividend of 10% (same); forward, £246,711 (£242,520).

William Denny & Bros.—Interim dividend on the ordinary shares of 1½%, tax free, as part of the centenary celebrations. A single payment of 10%, less tax, was made for each of the previous five years.

Power-Gas Corporation—Profit for the year to September 30, 1944, £19,457 (£19,248), after £15,000 (£11,000) for reserve, and £25,000 (£59,000) for tax provision; dividend and bonus of 10% and 2½% respectively (same); forward, £30,336 (£29,629).

CONTRACTS OPEN

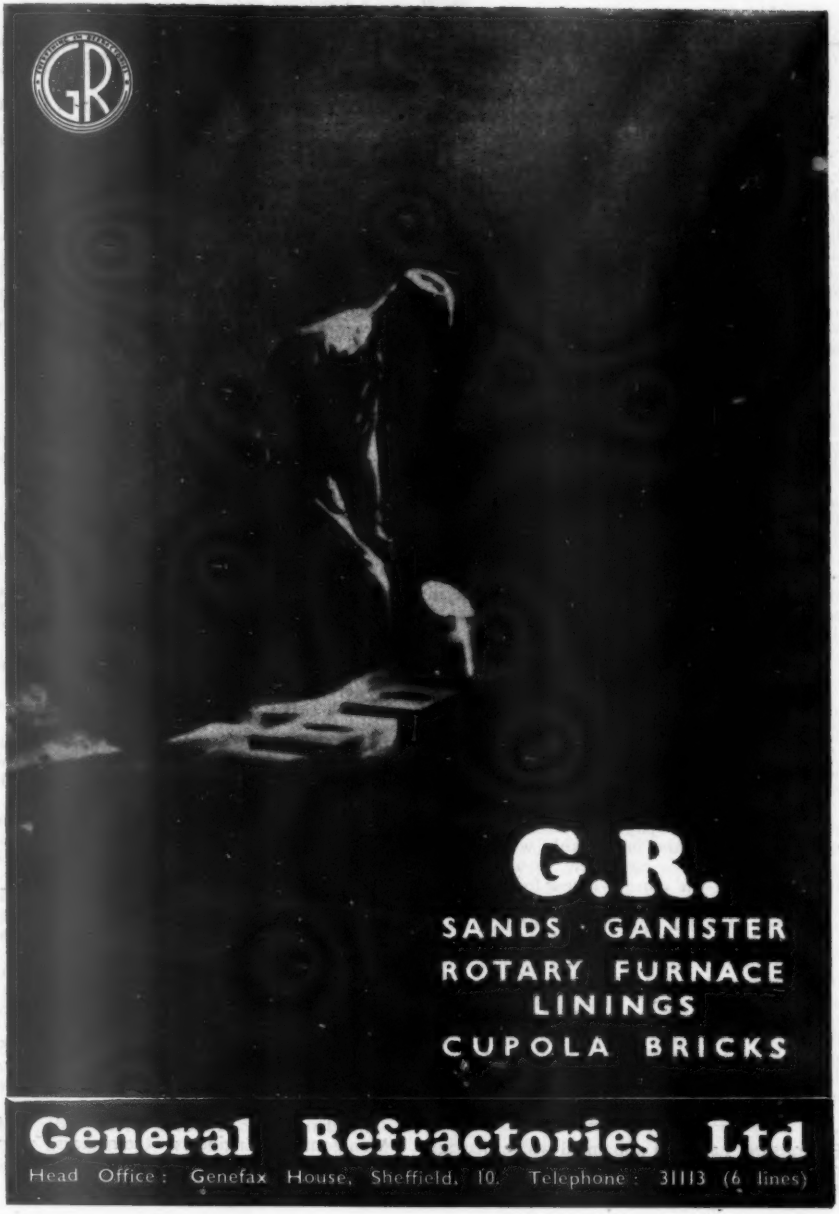
Any date given is the latest on which tenders will be accepted. The address is that from which forms of tender may be obtained.

Bootle, January 27—Cast-iron manhole covers and gully grates; tools; bolts, screws, nails, rivets, etc., for the Town Council. Mr. W. A. Harrison, borough engineer and surveyor, Town Hall, Bootle.

St. Ives, January 25—Supplying and laying 3-in. spun iron and asbestos water main at Somersham and Earith, for the Rural District Council. Mr. G. G. Yeandle, surveyor.

MR. J. M. DEWAR, chairman of Chadburns, Liverpool, Limited (formerly Chadburn's (Ship) Telegraph Company), died recently.

IN 1901 Mr. H. J. Owen happened to see a perspiring man pushing a broken-down motor cycle along New Street, Birmingham, and so characteristically went to his assistance. That motor-cyclist proved to be a certain Mr. Clement, founder of the Clement Talbot Motor Company, and it was this chance meeting that provided Mr. Owen with his first order for aluminium castings for motor engines. From this romantic beginning the Birmingham Aluminium Casting Company (1903), Limited, was founded, and it has proved to be the "acorn" from which a great "oak"—Birmid Industries, Limited—has grown, and under which 12,000 workers to-day find "shelter."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Raw Material Markets

IRON AND STEEL

Throughout December the output of pig-iron was steadily absorbed and requirements for the current month are certainly on no less a scale. Some of the foundries have taken on more work than has recently come their way and, subject to licensing, are seeking increased supplies of pig-iron. Available supplies are not unlimited, but there is an abundance of cast-iron scrap, and of this foundrymen are making extensive use. No mitigation of the restriction on the use of hematite is indicated, but low- and medium-phosphorus irons are plentiful, and so also are the various grades of ferro-alloys.

During the past two weeks deliveries of steel semis have been on a reduced scale. Holiday interruptions are partly responsible, but there has also been a contraction in the bookings for re-rolled material. The light mills, however, still have a substantial volume of work on hand, and there is every prospect of full absorption of the output of billets, blooms and sheet bars.

The activity of the sheet trade is especially noticeable. For the lighter gauges there is, in fact, little scope for further business during the current quarter. The prospect for the plate mills, which have had rather a lean time of late, is rather more favourable, and if the heavy section mills have not registered any increased activity, the demand for maintenance material for the collieries is as strong as ever.

NON-FERROUS METALS

There is very little change week by week in the situation governing the non-ferrous metals markets. No alterations in prices have occurred for a long time now, and none seems to be visualised. It seems probable, however, that the authorities are losing money on tin, at least. It is reported that, under a new agreement, America is to pay 63½ cents per lb. for Bolivian tin. This new rate presumably will apply to this country also, and it is equivalent to a price substantially in excess of the current figure for tin in this country. The call from war factories for tin continues to be met, although applications for licences to acquire the metal are closely scrutinised. More copper, tin and zinc is now going into civilian manufactures, chiefly in connection with the repair of buildings. The expenditure of ammunition on the Western Front may increase again the demand for non-ferrous metals for war purposes, but this is not expected to result in any tightening up of the restrictions on the use of metal. Aluminium and other light metals are now more freely available than at any time since the war began.

MR. F. COUSANS has been appointed works manager of Catton & Company, Limited, steel castings manufacturers, of Leeds.

NEW COMPANIES

(*"Limited" is understood. Figures indicate capital. Names are of directors unless otherwise stated. Information compiled by Jordan & Sons, 116, Chancery Lane, London, W.C.2.*)

L. F. Watts, 4, Southampton Row, London, W.C.1—Engineers, etc. £1,000.

Silwood Engineering Company, Mornington Terrace, London, N.W.1—£5,000.

T. Foulds (Foundry), Junction Foundry, Burnley Road, Colne—£2,000. J. and S. Foulds.

Tubal Cain Foundry & Engineering Works, Tyndall Street, Cardiff—£40,000. G. B. Bailey.

Calstock Engineering Company, Calstock, Cornwall—£2,000. R. J. W. and V. F. Sawbridge.

W. J. Bensley (Engineers), 6, Tudor Parade, London Road, Hounslow, Middlesex—£5,000. W. J. Bensley.

Midland Welding Supply Company, 105, Lakey Lane, Hall Green, Birmingham, 28—£10,000. E. and H. D. Edge.

Brady (Nelson), 2-4, Ann Street, Nelson, Lancs—Founders, engineers, etc. £100. R. W. Dyson and A. G. Brassington.

New & Salvage, 125, Edmund Street, Birmingham, 3—Engineers, scrap merchants, etc. £1,000. A. W. Bayley and A. A. Knowles.

Fellows-Bradbury, 147, Lichfield Street, Walsall—Metal manufacturers and dealers, engineers, etc. £2,000. C. F. and M. G. K. Bradbury.

Frederick Kay (Engineering), Abbey House, Victoria Street, London, S.W.1—£2,000. F. Kay and F. E. Jennings, Lyncote, Wray Park Road, Reigate.

De La Rue Gas Development—Manufacturers of gas and other heating appliances, etc. £10,000. A. Bryon, 21, The Park, Ealing, London, W.5, subscriber.

H. A. V. Hatfield (Worcester), Derby Road, Worcester—To take over the "Vic Engineering Company." £2,000. H. A. V. and E. A. Hatfield and W. H. Austin.

William Redfern, Albion Metal Warehouses, L.M.S. Goods Station, Ashton Old Road, Ardwick, Manchester—Metal merchants. £15,000. L. and W. Redfern.

Pelkman-Morton Manufacturing Company, 12, Greatrex Street, London, E.1—Engineers, etc. £1,000. J. H. N. and J. N. Pelkman, and G. H. and R. Morton.

T. M. Williams & Son (Llandovery), 17, Stone Street, Llandovery, Carmarthenshire—Manufacturers of hardware, etc. £6,000. S. and D. H. Williams and P. V. Wheeler.

John Brereton, 9-10, Glebe Buildings, Glebe Street, Stoke-on-Trent—Manufacturers of ovens, kilns, stoves, etc. £500. S. J. and J. B. Allport, T. Brereton, and W. Norcot.

Fyna Industries, 86-88, Queen Victoria Street, London, E.C.4—Engineers, manufacturers of bakers' ovens, etc. £10,000. W. Gilbert, J. D. Ferguson, and L. V. Russell.

Machynlleth Products, Newlands, Machynlleth, Montgomery—Engineers, toolmakers, metal workers, etc. £1,000. E. Lord, G. Ingham, C. R. Segrave, and H. H. Barker.